SECTION 16289

SURGE PROTECTIVE DEVICES

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LANL MASTER CONSTRUCTION SPECIFICATION

When editing to suit Project, author shall add job-specific requirements and delete only those portions that do not apply to the Project (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the Engineering Standards Manual (ESM) Electrical POC. Refer to http://www.lanl.gov/f6stds/pubf6stds/engrman/HTML/poc_techcom1.htm#elec for the Engineering Standards Manual Personnel Link Index.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within "stars" during editing.

Specification developed for ML-3 / ML-4 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

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PART 1 GENERAL

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Edit the following article to match Project requirements. Delete materials not applicable to Project.

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1.1 SECTION INCLUDES

A. Secondary surge arresters (SSAs) on power circuits at facility entrances to protect the structure from lightning.

B. Surge protective devices on signal, data, and control lines at facility entrances to protect the structure from lightning.

C. Transient voltage surge suppressors (TVSSs) for power quality.

1.2 LANL PERFORMED WORK

A. None

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01330:

B. Catalog Data: Submit catalog data describing surge protective devices. Include data substantiating that materials comply with specified requirements.

1.4 QUALITY ASSURANCE

A. Comply with the *National Electrical Code* (NEC) and NFPA 780 *Standard for the Installation of Lightning Protection Systems* for components and installation.

B. Provide products that are listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) for the application, installation condition, and the environment in which installed.

C. Manufacturer shall maintain an ISO 9000 certification.

D. Provide products suitable for use at a nominal altitude of 7500 ft.

1.5 RECEIVING, STORING AND PROTECTING

A. Receive, store, protect, and handle products according to NECA 1 *Standard Practices for Good Workmanship in Electrical Construction*.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Alternate products may be accepted, follow Section 01630.

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Edit the following article to match Project requirements. Delete materials not applicable to Project.

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2.2 SECONDARY SURGE ARRESTERS

A. Provide secondary surge arresters (SSAs) suitable for the protection of the structure in accordance with NFPA 780 and NEC Article 280.

B. SSAs shall be listed in accordance with UL 1449 Second Edition *Standard for Safety, Transient Voltage Surge Suppressors*, with product category guide designation OWHX.

C. Provide SSAs that meet IEEE C62.11 *Standard for Metal-Oxide Surge Arresters for AC Power Circuits*, for location Category C and IEEE C62.34 *Standard for Low Voltage Surge Protective Devices, Secondary Surge Arresters.*

D. Provide SSAs that use MOV technology and have visual indication of operational status.

E. Provide SSAs that have an internal fuse link that will open in the event of a sustained varistor-damaging over-voltage.

F. Provide SSAs with enclosure suitable for indoor or outdoor installation.

G. Provide SSAs for suitable for use on electrical systems with operating voltage(s) and number of poles suitable for the installation location(s) indicated on the Drawings.

H. Manufacturer: Square D “SDSA”, Joslyn “Surge Tec”, Cooper “Storm Trapper H.E.”

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2.3 SURGE PROTECTIVE DEVICES FOR SIGNAL, DATA, AND CONTROL LINES

A. Provide surge protective devices suitable for the protection of signal, data, antenna, and control lines.

1. Select surge protective devices with consideration for aspects such as the frequency, bandwidth, voltage, and current of the signal, data, antenna, or other communications lines and to ensure that insertion losses introduced by the surge protective devices are within acceptable operational limits.

2. Coordinate selection of surge protective devices for signal, data, antenna, and control lines with owner of equipment that is served by the lines.

B. Provide surge protective devices for of signal, data, and control lines that provide both common mode and differential mode protection.

C. Provide surge protective devices for signal, data, control, and alarm lines.

1. Devices shall be listed in accordance with UL 497B *Standard for Safety Protectors for Data Communications and Fire Alarm Circuits.*

2. Provide devices with ratings and connectors as required by the application.

3. Manufacturer: Phoenix Contact, EDCO, MCG Electronics

D. Provide coaxial surge protective devices for antenna and RF signal lines.

1. Devices shall be listed in accordance with UL 497C *Standard for Safety Protectors for Coaxial Communications Circuits*.

2. Provide devices with ratings and connectors as required by the application.

3. Provide bulkhead plates and low-impedance paths to ground where antenna cables enter the structure.

4. Manufacturers: TII Network Technologies, Inc, Cable Innovations, PolyPhaser

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Edit the following article to match Project requirements. Delete materials not applicable to Project.

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2.4 TRANSIENT VOLTAGE SURGE SUPPRESSORS

A. Provide transient voltage surge suppressors (TVSSs) suitable for the protection of electrical and electronic equipment.

B. TVSSs shall be listed in accordance with UL 1449 Second Edition *Standard for Safety, Transient Voltage Surge Suppressors,* with product category guide index XUHT, and UL 1283 *Standard for Safety, Electromagnetic Interference Filters*.

C. Provide TVSSs that have passed the UL 1449 Second Edition fault current test with ratings for the environments listed below using a standard 8x20 µS waveform; submit documentation of tests by an independent testing laboratory:

1. Service entrance applications (IEEE C62.41 Category C3): 240 kA per phase.

2. Lighting and appliance branch circuit panelboard applications (IEEE C62.41 Category B3): 120 kA per phase.

D. Provide TVSSs suitable for the nominal system voltage(s) indicated on the Drawings.

E. Provide TVSSs with UL 1449 500-ampere suppressed voltage rating (SVR) not exceeding the following:

System Voltage:	120/240V	208Y/120	480Y/277	480V delta
SVR (L-N):	400 V	400 V	800V	1500V

F. Protection Modes:

1. For Wye configured system, furnish TVSS with suppression elements from each line to neutral (L-N), from each line and ground (L-G), and from neutral to ground (N-G).

2. For Delta configured system, furnish TVSS with suppression elements from each line to each line (L-L) and from each line to ground (L-G).

G. Provide TVSSs with 200 kA interrupting capacity internal fusing.

H. Provide TVSS designed to equally distribute surge current to matched Metal Oxide Varistor (MOV) components to ensure equal stressing and maximum performance.

I. Provide a monitoring system for each TVSS that performs the following functions:

1. Continuous monitoring of fusing system for each phase.

2. Monitor individual MOVs.

3. Monitor for overheating in each mode due to thermal runaway.

4. Furnish solid state indicator lights on each phase indicating open circuit damage, thermal conditions, and over-current.

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J. Provide TVSS mounting as follows:

1. Integrated into service entrance [panelboard] [switchboard] [switchgear].

2. Integrated into isolated ground panelboards.

3. Designed for retrofit mounting immediately adjacent to protected [panelboard] [switchboard] [switchgear] with [NEMA 12] [NEMA 3R] [NEMA 4] enclosure.

K. Manufacturer: Cutler-Hammer “Clipper Power System”, Square D “SURGELOGIC”

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify mounting area is ready for equipment.

B. Verify that circuit rough-in is at correct location.

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Edit article to match Project requirements. Delete materials not applicable to Project.
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3.1 INSTALLATION

A. Install surge protective devices where indicated on the Drawings and according to manufacturer's instructions and the *National Electrical Code*. Have the manufacturer's installation instructions available at the construction site.

B. Install IEEE C62.41 Category C3 rated SSA in the service equipment to protect each ungrounded conductor on the line side of the service entrance disconnecting means.

C. Install IEEE C62.41 Category C3 rated SSA to protect each ungrounded conductor of power circuits that exits the structure to serve external detached equipment or other detached structures. Where such power circuits are longer than 100 ft install an IEEE C62.41 Category C3 rated SSA to protect each ungrounded conductor at both ends of the circuit.

D. Install UL 497B listed surge protective device for each for signal, data, control, and alarm line that enters the structure or exits the structure to serve external detached equipment or other detached structures. Where such signal, data, control, and alarm circuits are longer than 100 ft install UL 497B listed surge protective device at both ends of the circuit.

E. Install UL 497C listed coaxial surge protective device for each for antenna and RF signal line that enters the structure or exits the structure to serve external detached equipment or other detached structures. Where such antenna and RF signal circuits are longer than 100 ft install UL 497C listed coaxial surge protective device at both ends of the circuit.

F. Install IEEE C62.41 Category C3 rated TVSS in the service equipment to protect each ungrounded conductor on the load side of the service entrance disconnecting means.

G. Install IEEE C62.41 Category B3 or C1 rated TVSS in isolated ground power system branch circuit panelboards to protect each ungrounded conductor.

H. Install each surge protective device so it will be accessible for inspection and maintenance and so the condition monitoring indicator will be visible without requiring the removal of cover plates.

I. Install each surge protective device with minimum possible conductor length and a maximum conductor length of 18 inches.

1. Twist conductors tightly together and keep runs as straight as possible with no sharp bends or kinks.

2. Use approved means to make connections from the surge protective device to conductors to be protected.

J. Provide low-impedance grounding for surge protective devices.

1. Use approved means to make connections from the surge protective device to the point where the electrical power system grounded conductor is bonded to the grounding electrode conductor.

2. If the surge protective device is more than 20 ft away from the electrical system bonding point, make one or more supplementary grounding electrode connections at the surge protective device location. Use the building “main grounding electrode ground bar”, “main grounding electrode ground bar extensions”, effectively grounded building structural steel, and grounded water pipes as supplementary grounding electrodes.

3. Do not use a lightning protection system down conductor to ground a surge protective device.

3.2 FIELD QUALITY CONTROL

A. Provide final protection and maintain conditions to ensure that coatings and finishes are without damage or deterioration at final inspection.

B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

C. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.

D. Verify that each surge protective device is correctly connected and that all condition monitoring indicators operate properly.

END OF SECTION

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Do not delete the following reference information.
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FOR LANL USE ONLY

This project specification is based on LANL Master Construction Specification Section 16289 Rev. 0, dated May 17, 2004.